



ICARTT

2004 Air Quality / Climate Research Field Campaign

**Chebogue Point Workshop
Boulder, Colorado, USA
March 10-11, 2005**



Outline

ICARTT Background

Study Goals

Participants

Platforms and Networks

A few “first look” results

Workshop Goals



ICARTT - International Consortium for Atmospheric Research on Transport and Transformation

ICARTT - An international Collaboration

U.S.

NOAA - Climate/Air Quality

Universities and other private sector collaborators

NASA - North American Outflow

NSF - Carbon Cycle

DOE - Aerosol impacts on radiation

UNH - Host + surface network

Canada

Meteorological Service of Canada - Clouds (chemistry, transport, and optics), transboundary transport

Europe

Intercontinental Transport of Ozone and Precursors -ITOP - France, Germany, and U.K.

Guiding Questions

Air Quality

Who is responsible for poor air quality in New England (local vs distant sources)?

How is pollution altered during overnight transport (over land, over water to New England)?

How good are our air quality forecast models. How can they be improved?

Climate Change

How much do aerosols affect the radiation balance of the atmosphere?

What is the contribution of North American pollution to global air quality?

ICARTT - International Consortium for Atmospheric Research on Transport and Transformation

ICARTT - Platforms

NOAA



NASA



ICARTT - International Consortium for Atmospheric Research on Transport and Transformation

ICARTT - Platforms

MSC



NSF/DOD



U WY



DOE



U MD



ICARTT - International Consortium for Atmospheric Research on Transport and Transformation

ICARTT - Platforms

UEA FAAM



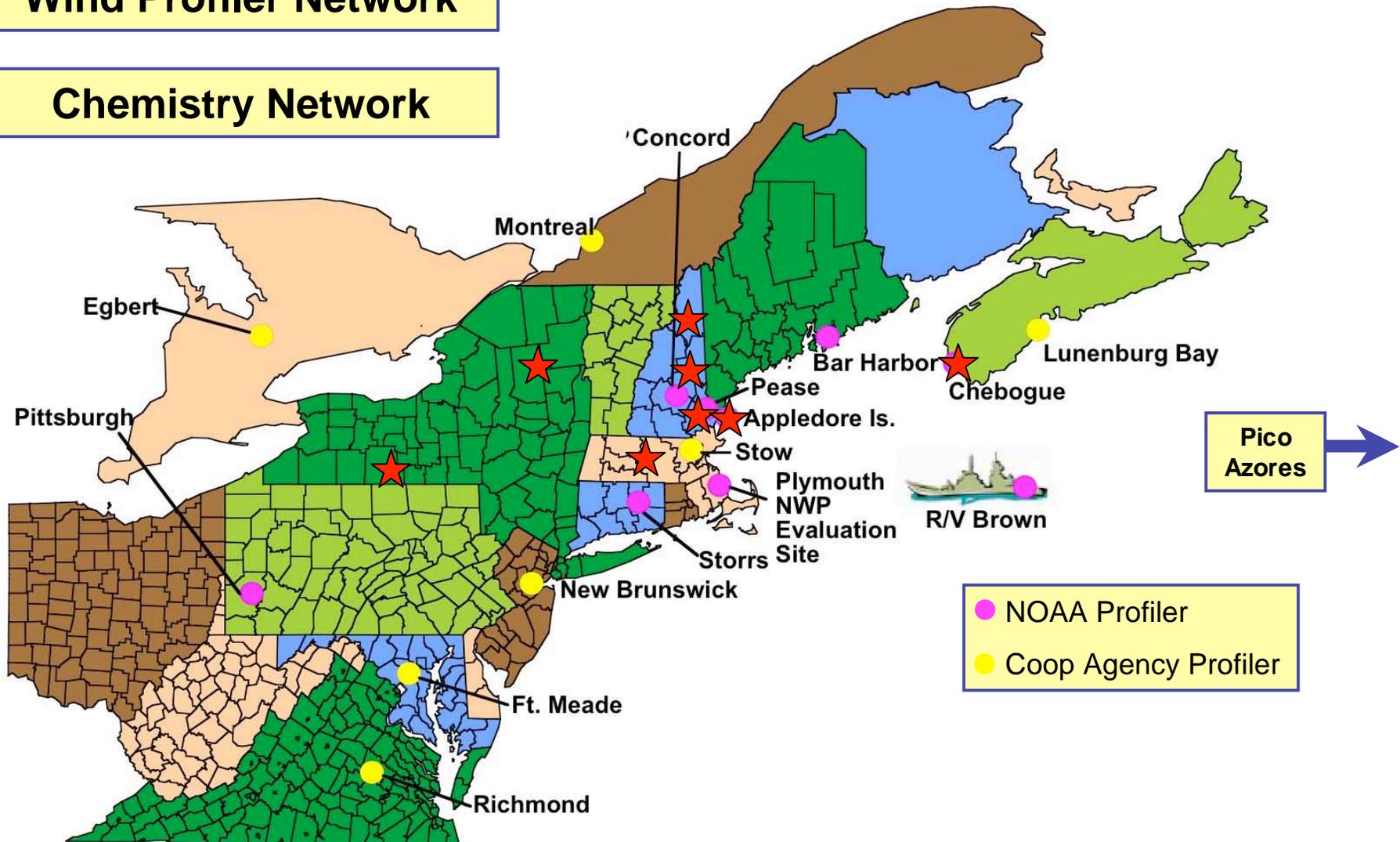
DLR



ICARTT - International Consortium for Atmospheric Research on Transport and Transformation

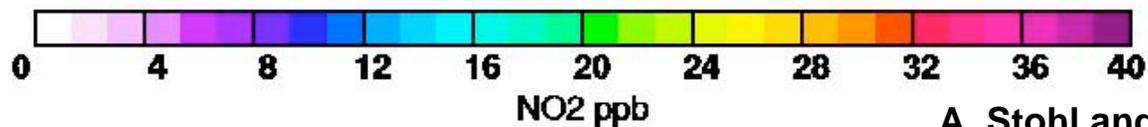
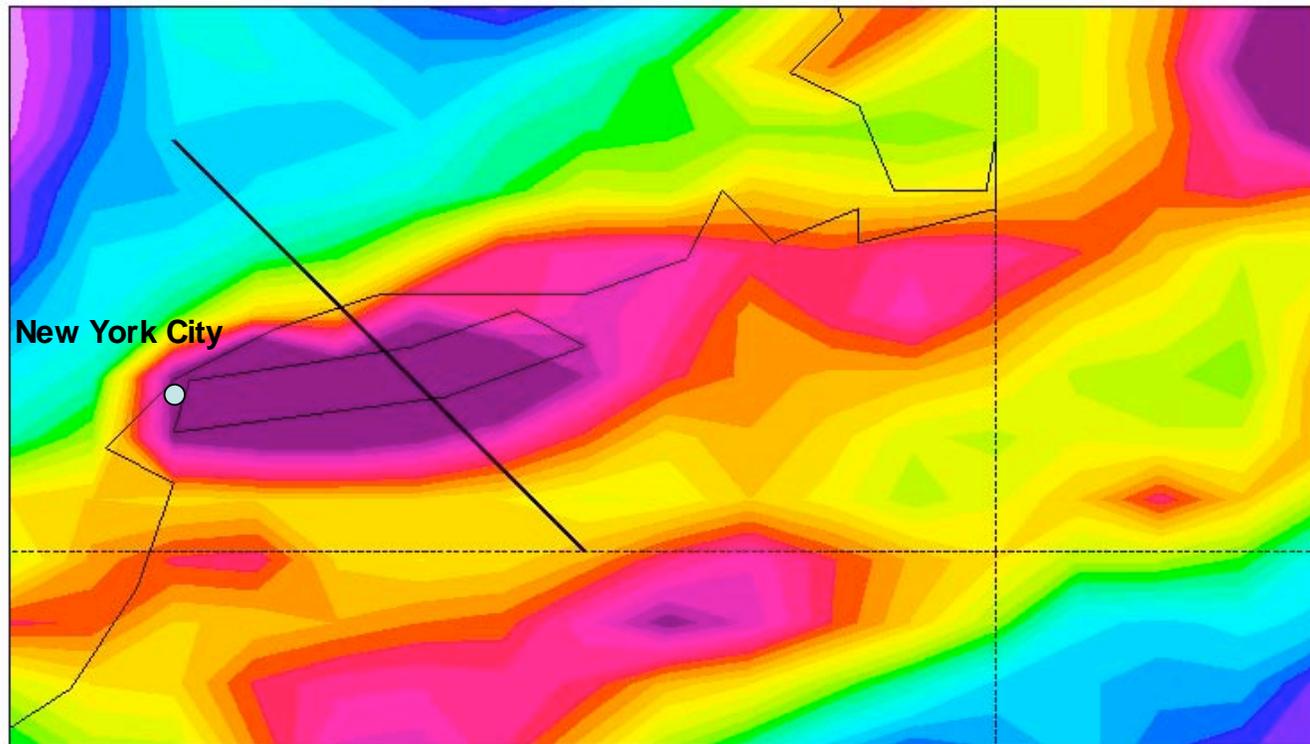
Wind Profiler Network

Chemistry Network



ICARTT - International Consortium for Atmospheric Research on Transport and Transformation

July 20 FLEXPART Plume Forecast 500 Meters, 22:00 UTC

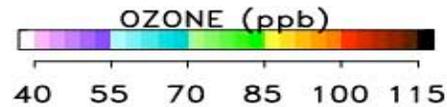


A. Stohl and O. Cooper, NOAA

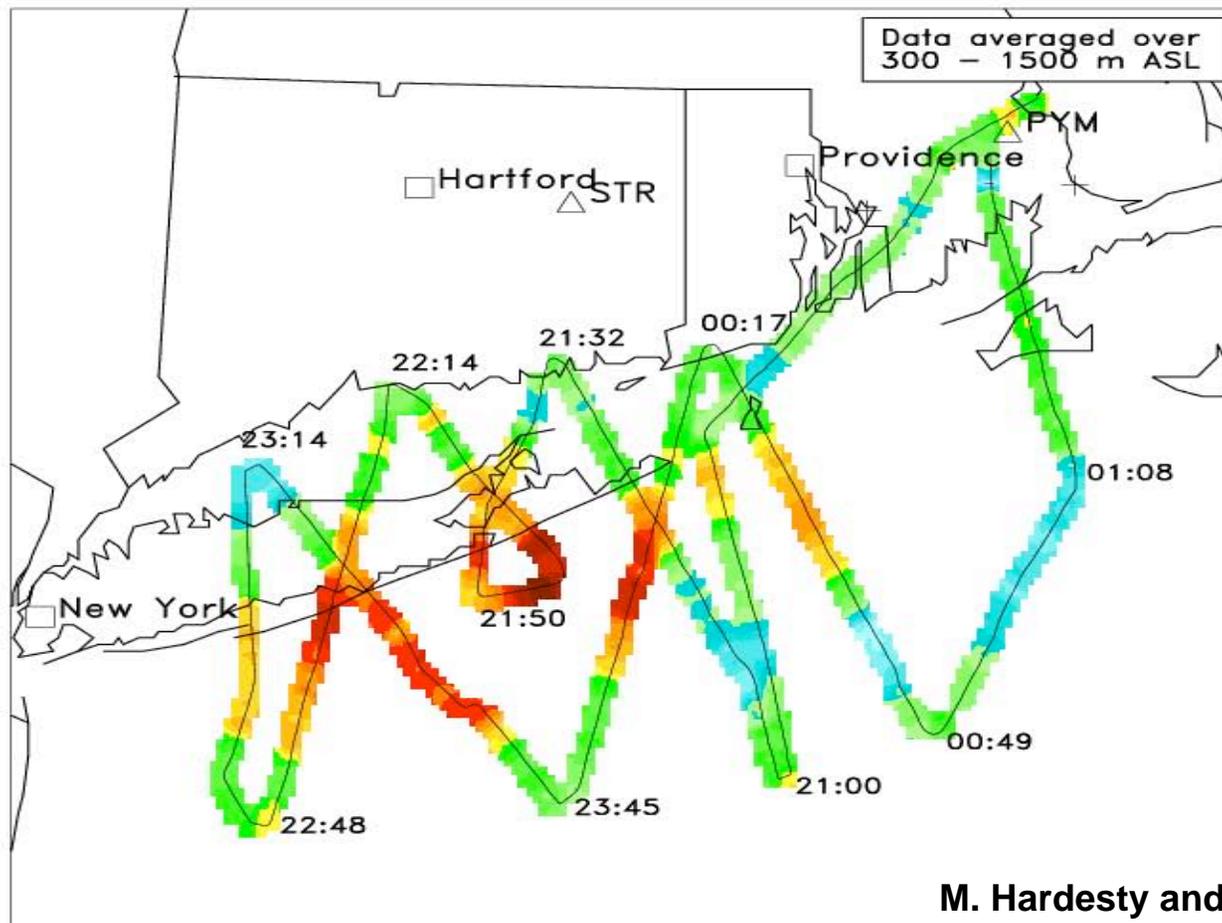
ICARTT - International Consortium for Atmospheric Research on Transport and Transformation

ICARTT 2004 20 JUL 2004

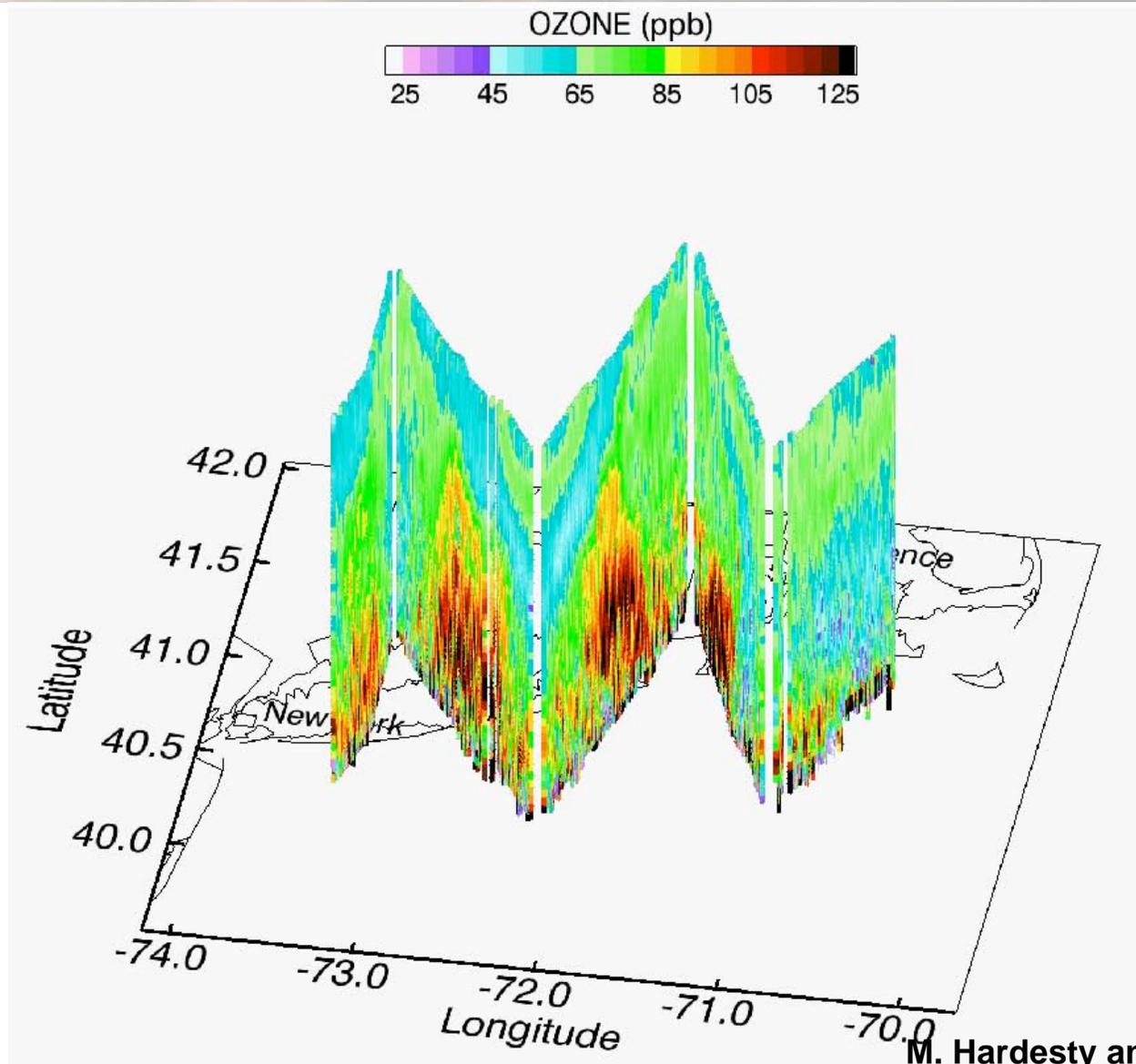
NOAA/ETL
Airborne Ozone Lidar



DC-3
20:00 - 01:30 UTC



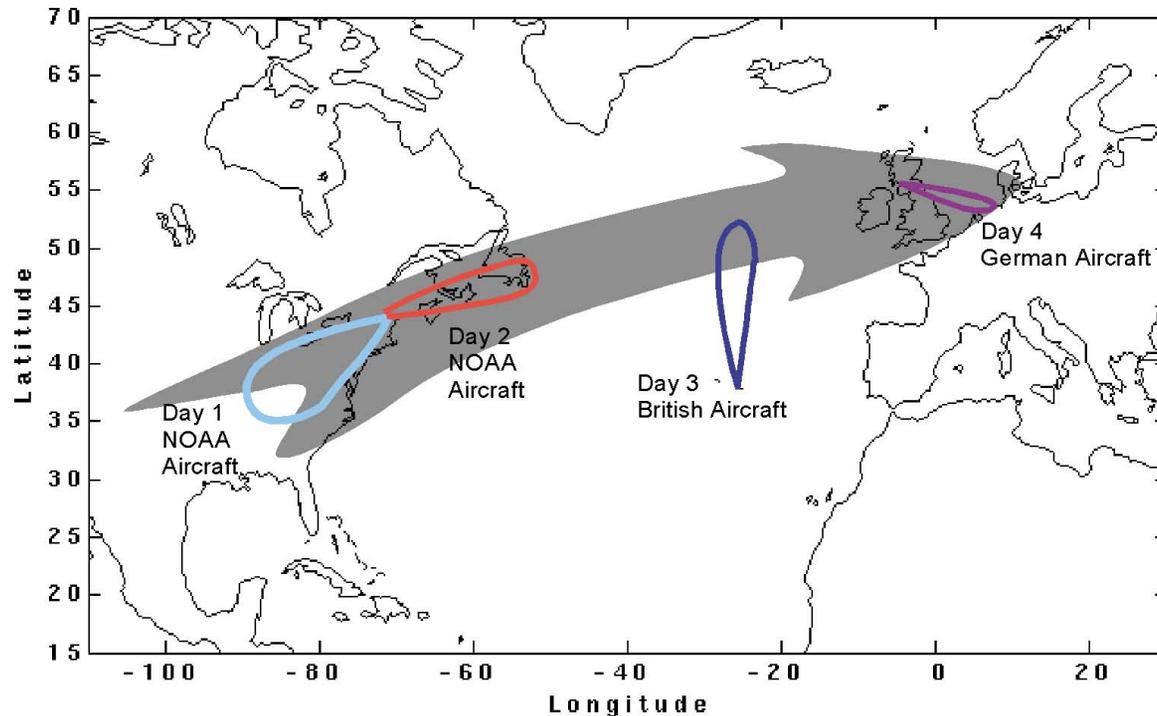
ICARTT - International Consortium for Atmospheric Research on Transport and Transformation



M. Hardesty and C. Senff, NOAA

ICARTT - International Consortium for Atmospheric Research on Transport and Transformation

Intercontinental Transport



Potential Lagrangian Experiments

New York City plume - July 20 - 26 (P-3, DLR Falcon, Mace Head)

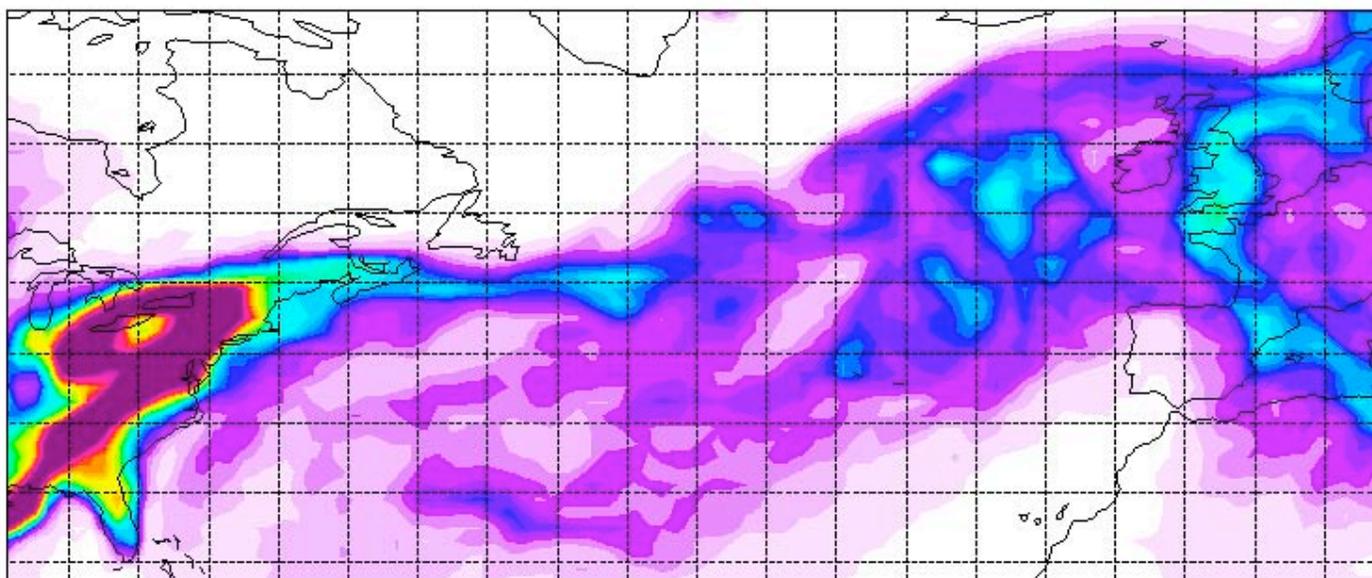
Low-level Outflow - July 15 - 18 (P-3, DC-8, BAe 146, Pico)

Warm Conveyor Belt - July 27 - August 1 (P-3, DC-8, BAe 146, DLR Falcon, Pico?)

Outflow - July 9 - 15 (P-3, BAe 146)

Alaskan/Canadian Forest Fires - July 18 - 31 (DC-8, P-3, BAe 146)

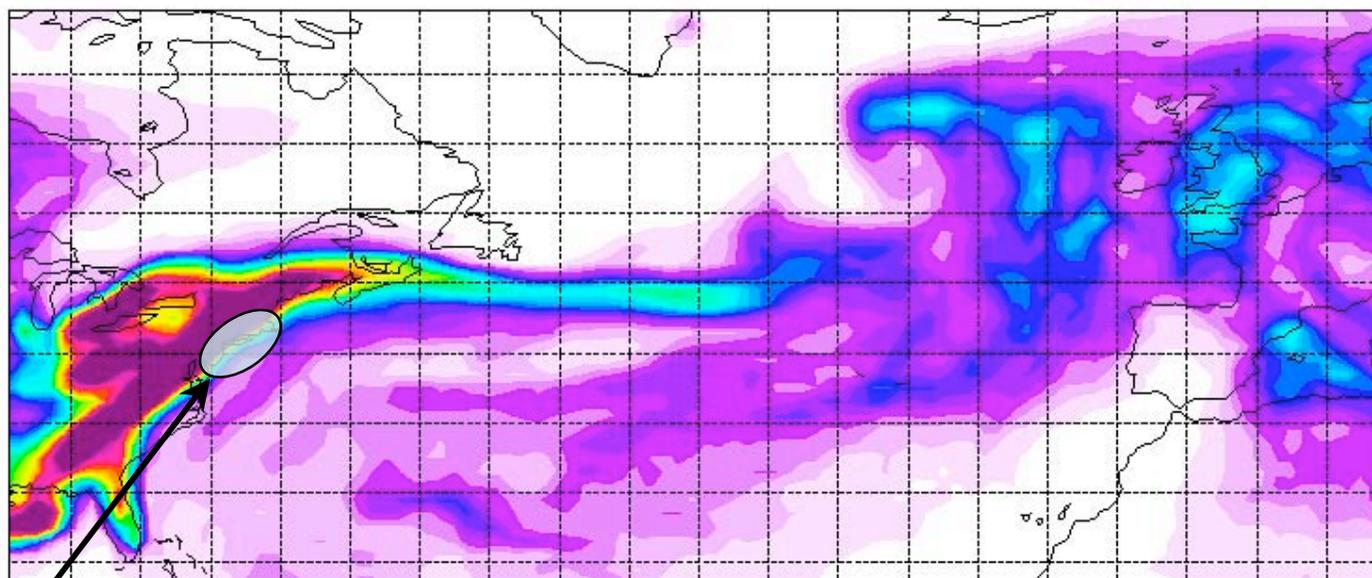
ICARTT - International Consortium for Atmospheric Research on Transport and Transformation



A. Stohl and O. Cooper, NOAA

ICARTT - International Consortium for Atmospheric Research on Transport and Transformation

July 27



**NOAA WP-3D
Sampling Area**

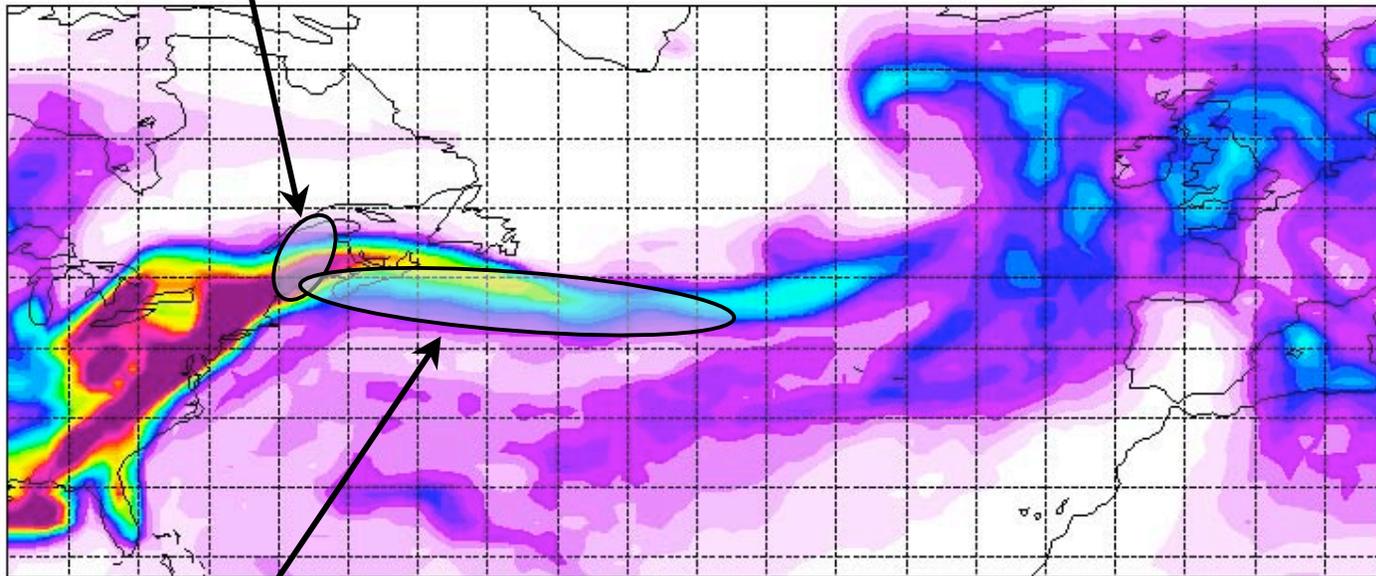


A. Stohl and O. Cooper, NOAA

ICARTT - International Consortium for Atmospheric Research on Transport and Transformation

July 28

NOAA WP-3D
Sampling Area



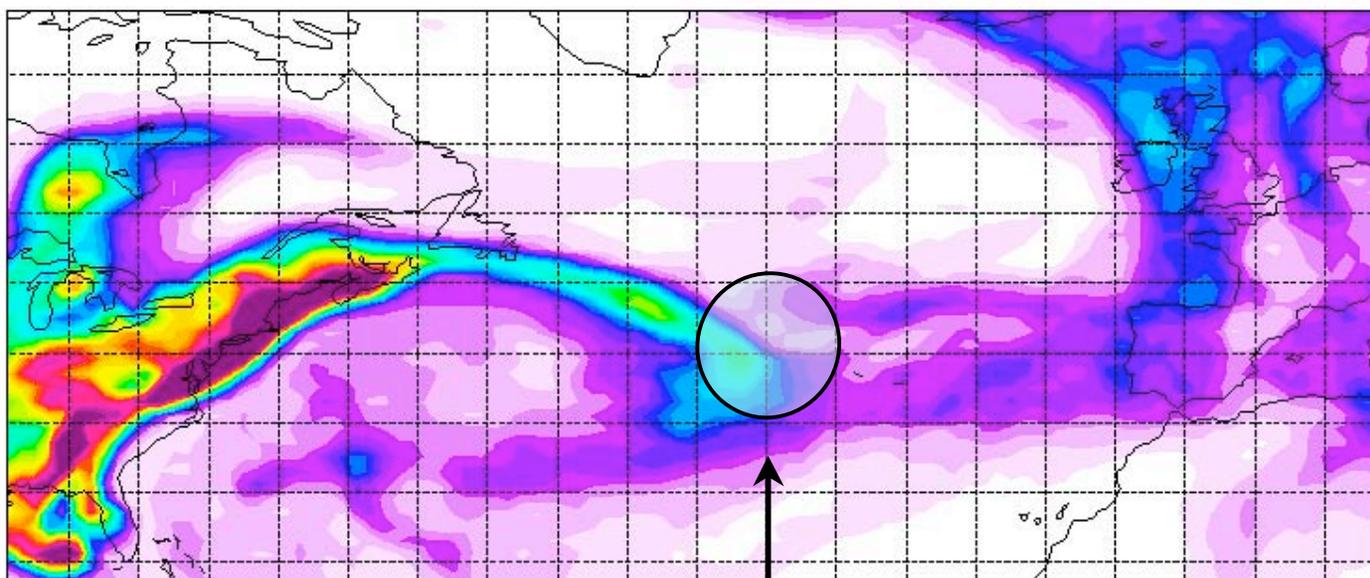
NASA DC-8
Sampling Area



A. Stohl and O. Cooper, NOAA

ICARTT - International Consortium for Atmospheric Research on Transport and Transformation

July 29



**BAe 146
Sampling Area**

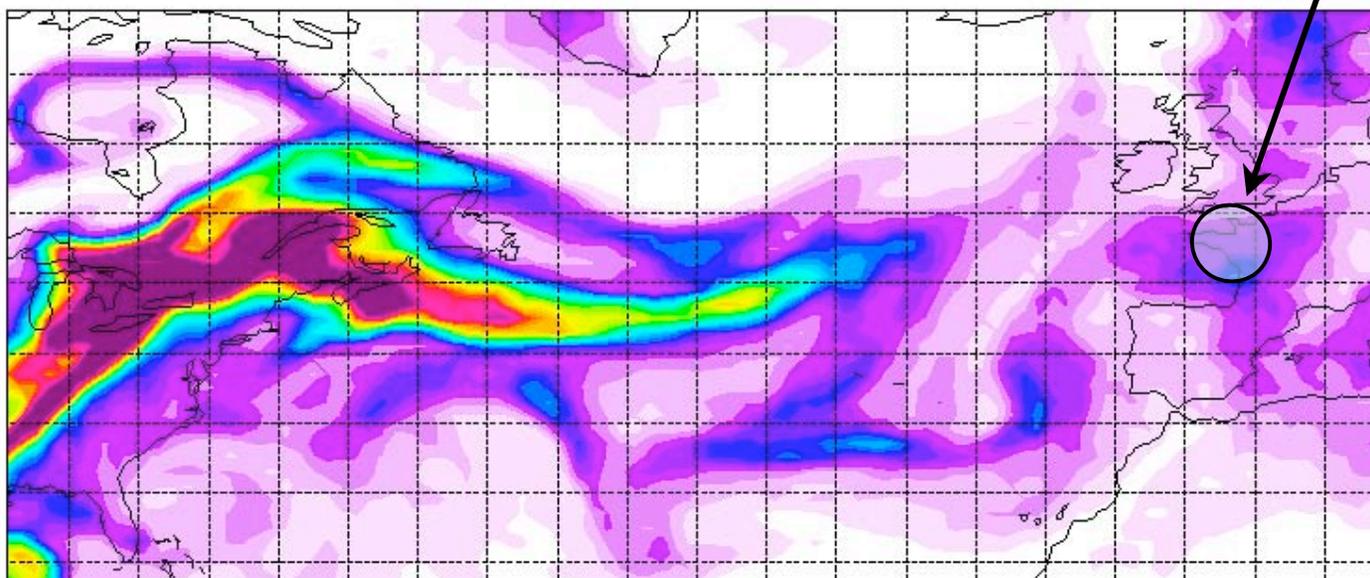


A. Stohl and O. Cooper, NOAA

ICARTT - International Consortium for Atmospheric Research on Transport and Transformation

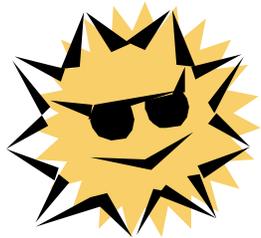
July 31

DLR Falcon
Sampling Area



A. Stohl and O. Cooper, NOAA

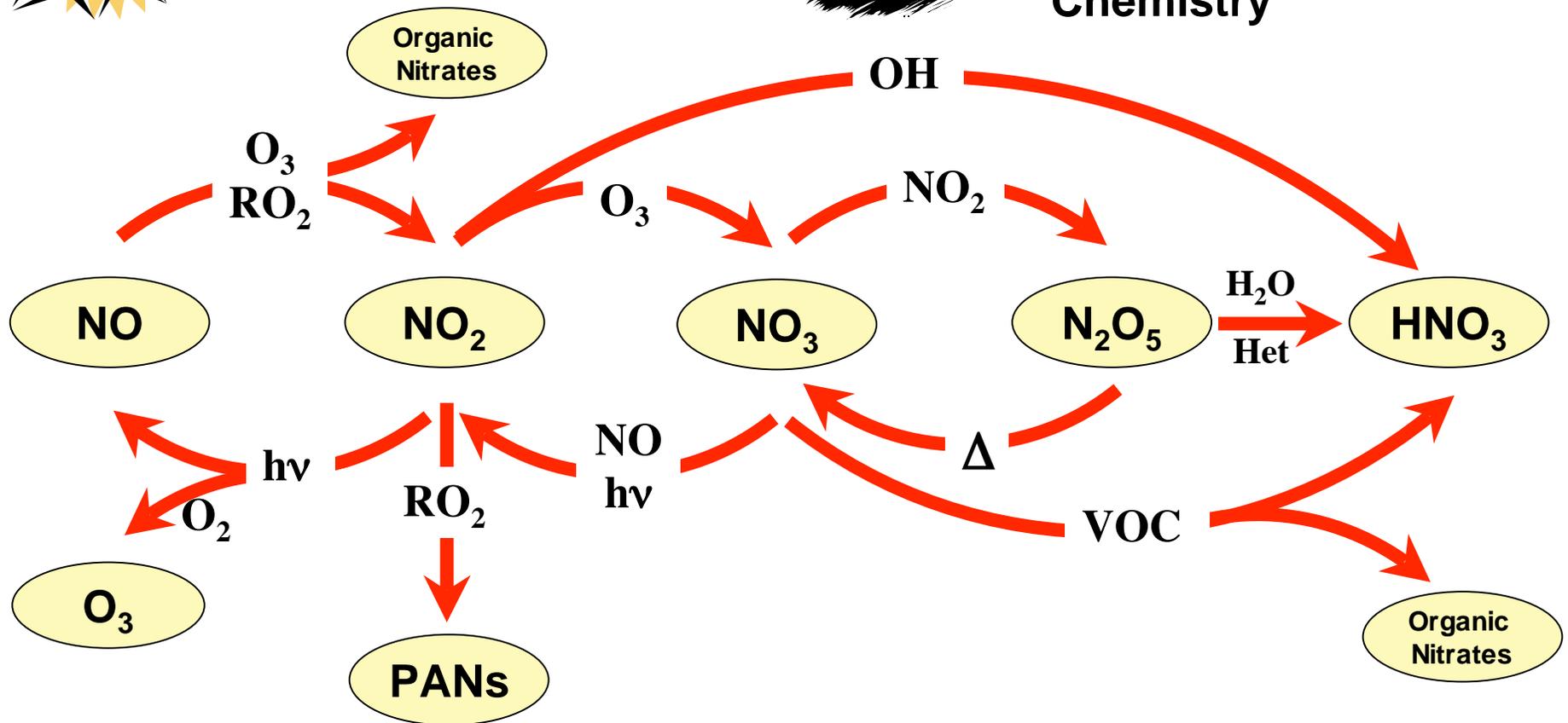
ICARTT - International Consortium for Atmospheric Research on Transport and Transformation



Daytime NO_x Chemistry



Nocturnal NO_x Chemistry



CaRDS “Quick Look” Findings

$\text{NO}_3 + \text{N}_2\text{O}_5$ can be a significant contributor to the nocturnal NO_x budget

NO_3 Measured in excess of 0.4 ppb

N_2O_5 Measured in excess of 3 ppb

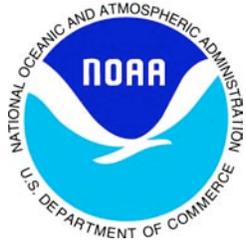
NO_3 anticorrelated with reactive “organics”

Over land - isoprene

Over water - DMS

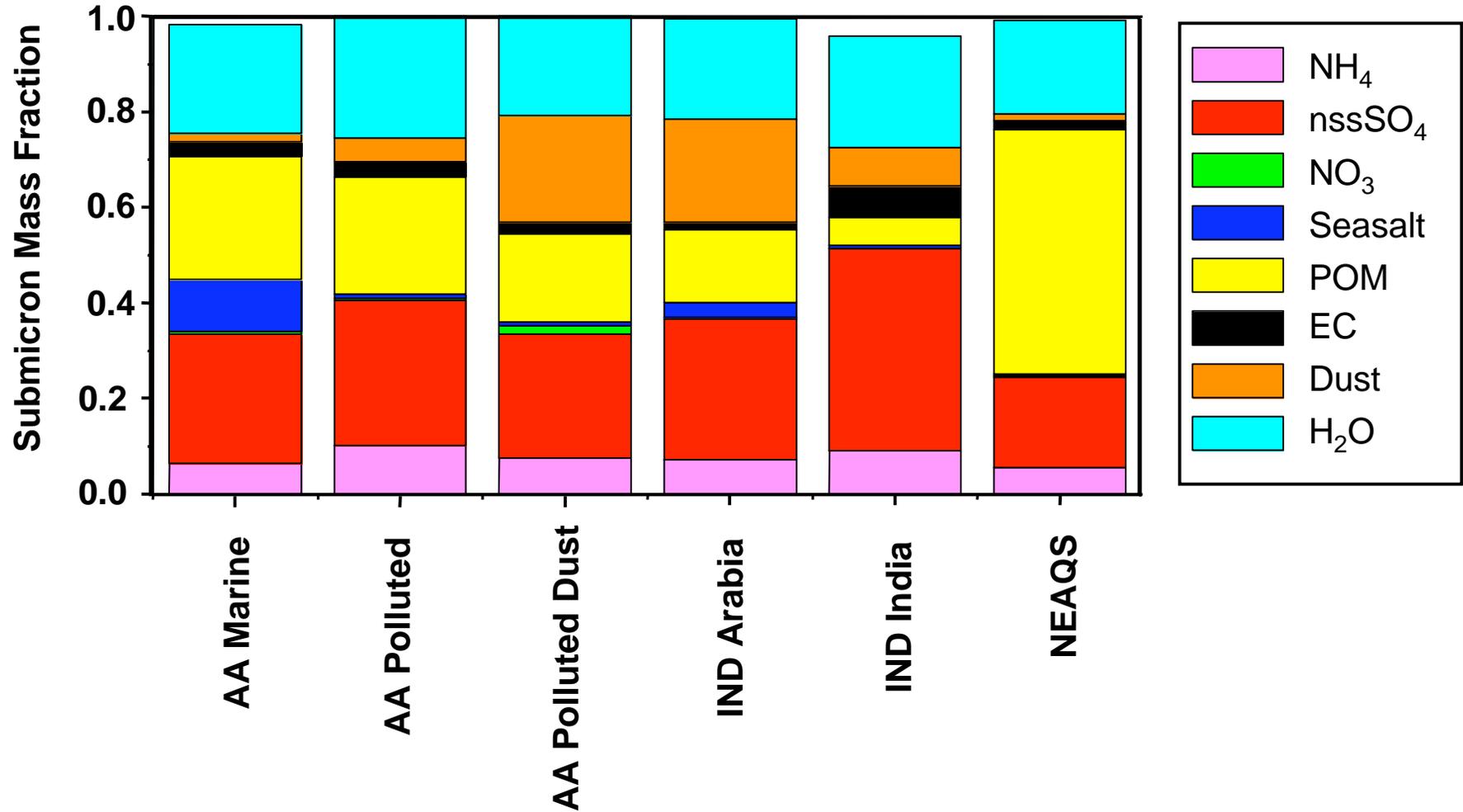
OH rules the day - NO_3 rules the night (oxidation during the day makes O_3 , oxidation during the night depletes O_3)

Nocturnal NO_x Chemistry key factor in next day's air quality



NEAQS 2002 - Findings

P. Quinn and T. Bates, GRL, 2003



What's Next

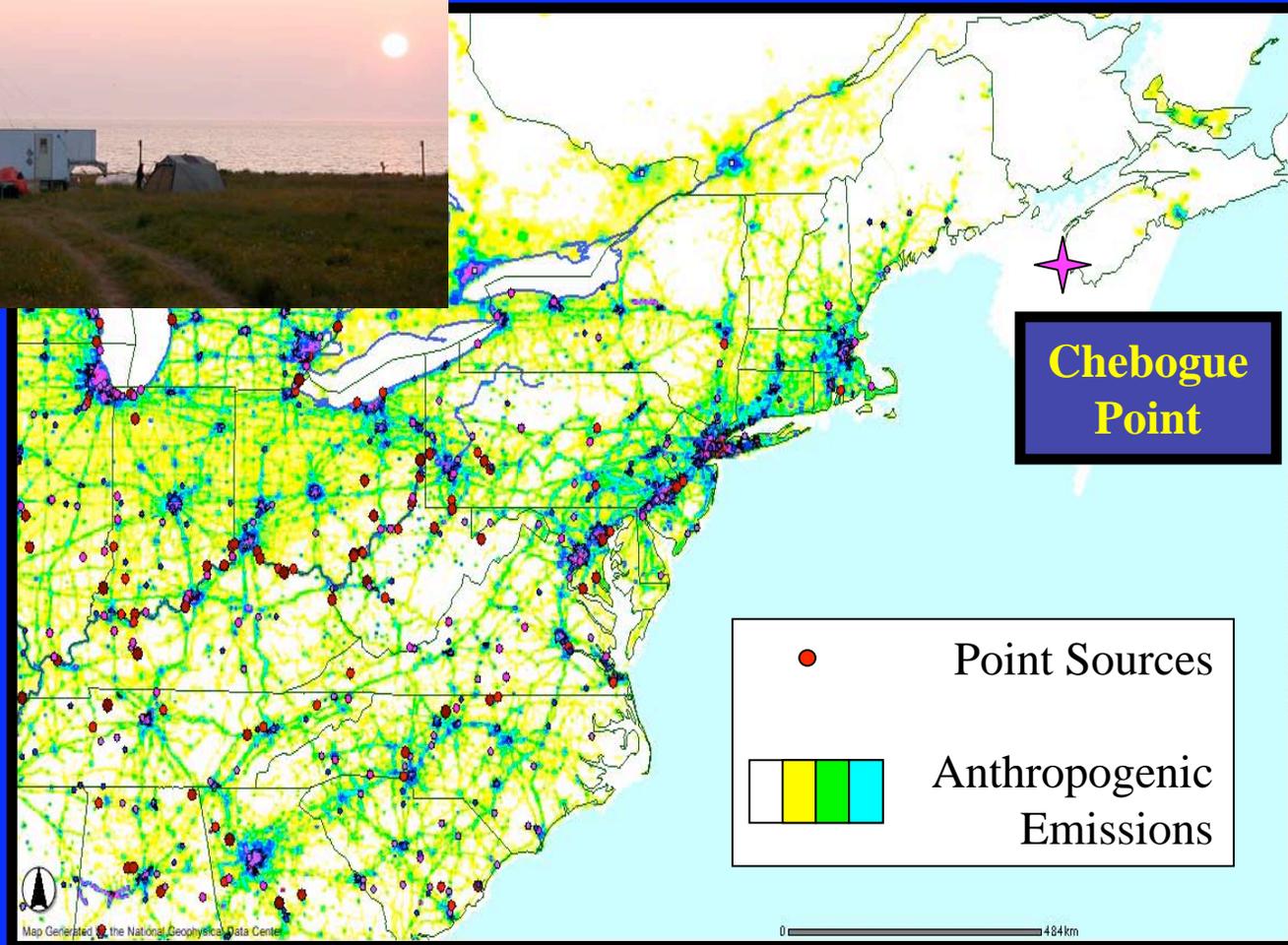
- Final data sets due - Jan '05
- Ron Brown workshop - March 8-9 '05
- J31 workshop - March 9-10 '05
- **Chebogue Point Workshop - March 10-12 '05**
- NASA INTEX workshop - March 29 - April 1 '05
- NOAA P3/DC3 workshop in Boulder - April 11-13
- **Data Analysis Workshop - August 8-12 '05**
- Special sessions at scientific meetings:
 - April '05 - EGS Meeting, Vienna, Austria
 - Dec '05 - Fall AGU Meeting, San Francisco, CA
 - etc.
- JGR Special Section (?)

Workshop Goals

- Only very briefly review the status of the (hopefully fully) final data sets.
- Encourage integration of Chebogue Point observations into the larger scale ICARTT mission.
- Assemble a list of papers that will be written.
- Lead authors give presentations summarizing the analysis planned for each paper.*

*Please give us a copy of your presentation for posting on the Chebogue Point ftp site ([ftp.al.noaa.gov](ftp://ftp.al.noaa.gov)) or web site (<http://www.al.noaa.gov/2004/CheboguePt.shtml>)

Chebogue Point, Nova Scotia



NOAA <http://map.ngdc.noaa.gov/website/al/emissions/Run.htm>

Chebogue Point Participants

In Situ gas phase measurements:

Allen Goldstein (U.C. Berkeley) VOCs-GC/FID/MS,
OVOCs -PTR/MS.CO, CO₂, H₂O, O₃, met param.

Ron Cohen (U.C. Berkeley) inorganic and organic oxidized
nitrogen species.

Dan Jaffe (U. Wash Bothell) - Rn-222

Jim Roberts (NOAA AL) PANs

Rob Tordon (MSC Canada) - gas phase

Chebogue Point Participants

Participants In Situ aerosol measurements:

Doug Worsnop (Aerodyne) aerosol chemical composition with Aerosol Mass Specs.

Hugh Coe (UMist) Aerosol size distribution by DMA & HTDMA

Allen Goldstein (U.C. Berkeley) and Susanne Hering (Aerosol Dynamics) in-situ thermal desorption GC-MS measurement of speciated organic composition of aerosols

Susanne Hering (Aerosol Dynamics) Condensation particle counter (Water CPC)

John Ogren (NOAA CMDL) Aerosol light scattering and backscattering, Aerosol light absorption, Total aerosol number, CCN, Size resolved aerosol total mass and chemistry

Chebogue Point Participants

Participants In Situ aerosol measurements:

Ellsworth Dutton (NOAA CMDL) Aerosol optical depth

Steve Cliff (U.C. Davis) Aerosol elemental composition by
DRUM Sampler

Mark Thiemens (U.C. San Diego) Stable isotopes of sulfate
and nitrate aerosols

Participants Remote measurements:

Allen White (NOAA ETL) radar wind profiler.

Tom Duck (Dalhousie University) Lidar measurements of
cloud and aerosol backscatter, depolarization, and
extinction, and possibly water vapor, sun photometer.

Ellsworth Dutton (NOAA CMDL) direct, diffuse and total
broadband solar irradiance (downwelling), total
downwelling IR irradiance.

Ozone sonde releases from Yarmouth